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Original Article

AUTOCAD TECHNOLOGY MATCH IN ACADEME AND INDUSTRY

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ABSTRACT

The advance in technology caused by the rapid pace of development in computers was changing the demand of workers. The study evaluated the Auto Computer-Aided Design competency level of the drafting technology graduates along with the standard requirements in order to come up with Academe and Industry Matching Guide. Descriptive survey method was used in the study. The profile of the Auto Computer-Aided Design competence level requirement were treated using the frequency and percentage. The same statistical method was used in the Computer-Aided Design competence level of the graduating students and instructors in Drafting Technology.

Based on the findings, Auto Computer-Aided Design technology was the most utilized design software. Auto Computer-Aided Design skill was the favored skill by construction industries. There was a strong significant relationship between the company's Auto Computer-Aided Design skill requirements and the extent to which these requirements were taught.

The most pressing problem met by the respondents in Auto Computer-Aided Design was the lack of facilities, lack of time, updated software, lack of space in the classroom, and lack of time for Auto Computer-Aided Design instruction.

Auto Computer-Aided Design technology must be offered as an independent and separate subject in the institution.

KEYWORDS: Auto Computer-Aided Design, Competency Level, Drafting, Industry & Technology

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1. INTRODUCTION

Engineering systems have been undergoing rapid transformation due to advances in Information Technology. The advance in technology caused by the rapid pace of development in computers are changing the demand of workers who can develop, maintain, and use it (Bone, 1994). Computer-aided design (CAD) is a general-purpose computer aided design programmed to prepare a wide variety of two-dimensional drawings and three dimensional models. As such, CAD operators can manipulate images in moments that used to take hours and days with paper and pencil (Bone, 1994).

Computer-aided design (CAD) technology has a profound impact upon drafting technology curriculum. As technology changes, instructors must keep the focus on the curriculum by updating its AutoCAD skills and competencies along with the requirement of the industry (Yuen, 1990). CAD instruction is necessary to prepare drafting students for industry needs. Oblinger and Verville (1998) emphasized the role of educational institutions in preparing students for the world of work by gaining practical experiences in partnership with the various industry sectors. Integration between school and business industries is needed so that employers can contribute towards program or curriculum development, students will understand and learn what the employers expect from them and

institutions could respond to industry needs (Oblinger and Virville, 1998).

Computer-aided design (CAD) is helping the industry increase competitiveness by enabling research and design work to be transformed into finished products with higher quality and at lower cost (Skinner, 1996). By automating the routine work of replicating objects, CAD frees up time so that designers can spend more time during the design process. Productivity and profitability ratios within architectural firms that utilize CAD over traditional drafting methods (TRAD) have been estimated to be as high as 20:1(Skinner, 1996).

With the development of faster, smaller and less costly computers, CAD has become popular for drafting and related engineering analysis. Due to the relative simplicity of building design, architects were among the first users of CAD (Bone, 1994). Today, "everything from new car designs to homes, high-rises, and machine parts are coming to life on computer screens, and modern technology is advanced with each keystroke"(Skinner,1996). A number of industries benefited from the services of a CAD operator, including architecture, civil and structural engineering, mapping and surveying.

For the drafting graduates, in particular, they must have the necessary competencies required by the industries. In order for the drafting technology graduates to effectively meet the CAD needs of industry, an academe industry matching guide must be developed based on the CAD related technical skills and competencies required by some selected construction firms in Cebu City. Matching individual's educational attainment with the needs of the industry, consequently enhances their chances of finding employment (Robinson, 2006). Kwok (2004) emphasizing also that curriculum must assist the students in enhancing their skills and competencies necessary to obtain employment.

Furthermore, the BSIT- Architectural Drafting Technology curriculum follows the guidelines and mandates promulgated by the Commission on Higher Education (CHED), and the Technical Education and Skills Development (TESDA) standards towards quality technical education, and skill development as the leading partner agency in the development of the Filipino workforce with world-class competence and positive work values.

The study evaluated the AutoCAD competency level of the architectural drafting technology graduates along with the standard requirements of the construction industries in Cebu, in order to come up with Academe and Industry Matching Guide.

2. METHODOLOGY

2.1. Study Area

The study was conducted in Cebu Technological University – Argao Campus as one of the satellite campuses of Cebu Technological University system. The campus was located in the municipality of Argao, south-eastern part of Cebu, around 67 kilometres from the heart of Cebu City. At present, CTU-Argao was offering Bachelor of Science in industrial Technology major in Drafting Technology. The campus cater purely college and graduate students.

2.2. Method

Descriptive survey method was used in evaluating the AutoCAD competency level of the architectural drafting technology graduates along with the standard requirements of the construction industries in Cebu, in order to come up with Academe and Industry Matching Guide. A descriptive design is aimed at describing what is and not trying to determine or infer any causal relationships (Borg & Gall, 1989). In a descriptive study, summary data can be reported using measures like mean,

median, standard deviation, variation and correlation between variables, as well as other empirical data (Jonassen

The study utilized an adapted questionnaire to gather the data needed in the study. The questionnaire was developed by Francisco (2000). A total of 32 respondents comprising the owner/managers of selected construction industries in Cebu, graduating architectural drafting students, as well as the CTU drafting instructors.

The profile of the respondents were treated using the frequency and percentage, and a T-test statistical tool was used in comparing perceptions on the competency level of the architectural drafting technology graduates along with the standard requirements of the construction industries in Cebu, at 0.05 level of significance.

3. RESULT AND DISCUSSIONS

3.1. Profile of the Respondents

The ages of the respondents were 38 and 48 years old and they were both masters' degree holders, with significant years in AutoCAD training and teaching AutoCAD both with 15 years and 6 years respectively. Both have industry experience as well prior to teaching.

Greater percentage of the industries were categorized as Contractor or engaged in Construction Management with 44.44 percent. Next in rank was the Architectural category with 33.33%. While the Civil Engineering and Government Agency got 22.22 percent. The rest were Surveying, Structural Engineering, and others with 11.11 percent. This implies that there is a greater market for construction industry in Cebu since it was mostly in demand.

The number of employees per industry varies in number. One company had 107 employees, next had 50 employees, 45; 40; 25; 12;10, and the company with the least number had 6 employees. The number of employees varies depending on the number of tasks to do as well as on the number of projects to meet. Higher project demands require more manpower to do the tasks.

The results of this study confirmed that only one(1) employer hired 10 full time draftsmen, and other employer hired five (5) draftsmen two (2) draftsmen by other employer, and next employer hired one (1) draftsman. The findings further revealed that companies vary the type of business and the number of draftsmen employed in their company. And it was evident that drafting graduates are flexible and they can work any type of business that their skills were considered necessary.

Civil drawings, architectural drawings were the most in demand drawings by the respondents. The next type of drawings required from the industry was structural 88.89 percent, then followed by electrical/electronic got with 77.78 percent. Landscaping and mapping came after with 55.56 percent followed by technical illustration and topographical with 44.44 percent and the least was geophysical and pneumatic/hydraulic which has 11.11 percent. Result of the study indicates that most employer types, especially major employers of drafters, prepare a wide variety of drawing types. As such, specific drawing types cannot be directly correlated to specific employer types. Civil and architectural drawings were mostly required because Construction Industry was the booming field in Cebu.

3.2. Drafting Methods

Three (3) or 33.33 percent of the respondents utilized traditional or conventional drafting method which was non-CAD in nature.On the other hand, six (6) or 66.67 percent of the respondents made use of CAD. This means that a greater number of the respondents favored using the CAD over the traditional or conventional drafting methods.This is because CAD takes

only a shorter time to finish the project than the conventional method. The literature review indicates that opposing schools of thought exist concerning the need for traditional drafting (board drafting) competencies. While CAD instruction is necessary to prepare architectural drafting students for industry needs, it is important to note that the CAD system was nothing more than a tool in the hands of the designer and that computers cannot draw by themselves. Therefore, the curriculum needs to continue to include the basic drawing fundamentals and the use of basic drawing tools (Yuen, 1990).

3.3. Software Used

AutoCAD was the most common software utilized in the industry. Eight (8) or 88.89 percent of the respondents preferred to use the CAD software. One (1) or 11.11 percent of the respondents preferred ArchiCAD. This implies that AutoCAD was most favored by employers over ArchiCAD. According to Irwin (1992), AutoCAD was the most popular brand of CAD software utilized in the Saginaw, Michigan area. Blockley and Godfrey (2000) also indicate that AutoCAD was one of the most popular brands of CAD software being utilized currently because it was user friendly. It takes only a shorter time to finish using the CAD software and measurements were accurate over the manual method.

3.4. Perceived Level of Importance of Autocad Competencies among Construction Industries

Basic CAD. Out of the 24 basic CAD skills that were listed on the survey, 14 (58.3 percent) were considered to be very much important skills. Seven of the 24 items (29.16 percent) were classified as much important skills and three (3) of the items (12.5 percent) were considered important skills. The most favored CAD skills with a mean of 5.0 involve performing drawing set-up and control entity properties.

Next in terms of importance involves controlling coordinates and display scale, utilizing non-geometric editing command, plot drawing in media using correct layout and scale, using layering techniques, creating texts using appropriate style and size to annotate drawings, utilizing geometry editing command, using associative dimensioning correctly, creating new drawings, minimizing file size, using and controlling accuracy enhancement tools, grouping techniques, and constructing geometrical figures.

The rest of the skills were identified as with much importance like the use of viewing commands, using standard parts or symbol libraries, identifying, creating, storing, and using appropriate symbols, using display commands, creating a 3-D wire frame models from 2-D Geometry, using query command to interrogate database and creating a 2-D Geometrical from 3-D models. Three (3) of the skills were identified as important which include revolving a profile to create a 3-D object, creating a wireframe/solid models, and creating objects using primitives.

Considering the overall responses, the Basic CAD skills were considered as very much important with a grand mean of 4.21. Performing drawing set-up and controlling entity properties were considered as very much important because these are the very basic skills every drafter must acquire. The result was in complement with the study of Francisco (2000) who uses the national occupational skill standards.

Advanced CAD. The advanced CAD skills with the highest perceived level of importance were trimming surfaces and editing primitives with a weighted mean of 3.75. These were followed by creating wire frames or solid models, creating features-based geometry and creating cut session got a mean of 3.63, using template and library files to establish drawing standard presets with 3.56 mean, creating joint surfaces with a mean of 3.50, manipulating surface normal with a mean of 3.50, extending surfaces with a mean of 3.50, and obtaining surface properties data with a mean of 3.44 were considered as much important.

Some skills were considered as important which includes creating offset surfaces with a mean of 3.38, finding intersection of two surfaces, constructing and labeling exploded assembly drawings and, performing Boolean operations, creating a fillet or blend between two surfaces with a mean of 3.25, manipulating associated non-graphical data with a mean of 3.11, creating non-analytic surfaces using appropriate modeling, modifying geometry via Boolean operations, shading/rendering objects, identifying gaps in non-interesting surfaces, performing customization to improve productivity, developing geometry using parametric programs got a mean of 3.00, extracting wire frame date from surface/solid geometry and obtaining mass property data got a mean of 2.89, creating analytic surfaces using appropriate modeling planes and analytic curves and performing axis view clipping got a mean of 2.88, extracting geometric data and extracting attribute data got a mean of 2.78, and least is editing control points with a mean of 2.75.

The overall perceived level of importance of advanced CAD skills got a mean of 3.24 which means important. The advanced CAD skills were important but not to a greater extent. Trimming surfaces and editing primitives were identified as important skills in Advanced CAD. These skills ought to be given more emphasis in instruction because these are the essential skills required in industries (Francisco, 2000).

Basic Architectural Drawings. The skills under basic architectural drawings with highest perceived level of importance with a mean of 5.0 were preparing floor plans with dimensions, preparing foundation plans and detail drawings with dimensions, preparing elevation drawings with dimensions, and preparing sections with dimensions.

Other skills which were considered as very much important were preparing schedules with a mean of 4.89, preparing truss details and, preparing plot drawings with a mean of 4.78, preparing stairway drawings and preparing plumbing plan drawings got a mean of 4.67, preparing landscape layouts, building architectural drawings and preparing electrical plan drawings got a mean of 4.44, and preparing fireplace drawings with a mean of 4.22.

Other skills were considered as much important were preparing HVAC drawings with a mean of 3.78 and other basic architectural drawings with a mean of 3.50. Interpreting vendor's catalogs, technical tables, and building codes has a weight of important with a mean of 3.33.

Considering the totality of the responses, the level of importance of the basic architectural drawing skills as perceived by the respondents was very much important with a grand mean of 4.50. The result of the study ought to be skills which give more emphasis in learning architectural drawing, which also serve as the essential skills required in industries (Francisco, 2000).

Basic Structural Drawing. The result of the study revealed that basic structural drawing skill was considered as very much important. Three (3) skills were also identified with much importance in architectural drawing. These skills includes; detailing structural beam connection, detailing concrete reinforcement, and using structural member and reinforcing concrete and manual technical tables. The rest of the skills have a weight of importance. These skills includes; basic structural drawing, preparing material take off lists, and identifying symbols. The result of the study implies that the techniques of drafting are an important part of all types of engineering and manufacturing and are also used in such diverse fields as architecture and geology (Encarta, 2009).

Basic Electrical Drawing. Three (3) among the skills got a mean of 4.00 which includes preparing electrical plan, preparing schedule of loads, and preparing load computation. Interpreting basic electrical standards and symbols, preparing schematic diagram, and other basic electrical drawing got means of 3.89, 3.88, and 3.67 respectively.

The overall perceived level of importance of basic electrical drawing skills got a weight of much important with a grand mean of 3.91. The result implies that these skills were necessary in architectural drawing, as required also by the construction industry (Francisco, 2000).

3.5. Extent of Teaching the Identified Competencies in the Drafting Technology Class

Basic CAD. The basic CAD skills in drafting technology with a description as very well delivered include**;** creating new drawing and perform drawing set-up, controlling entity properties, utilizing geometry editing command, constructing geometrical figures and utilizing non-geometrical editing command, creating text using appropriate style and size to annotate drawings, using and controlling accuracy enhancement tools and using viewing commands, using display commands, and controlling coordinates and display scale.

In totality, the perceived extent of teaching Basic CAD Skills in Architectural Drafting Technology Class has a grand mean of 4.17, with an interpretation of well delivered. This implies that none of the competencies were missed in the class discussion. It was manifest that these topics were well taught in the major subject of drafting technology, and they have ample time to practice the activity using the computers, as required also in the industry.

Advanced CAD. Among the skills used in advanced CAD, trimming surfaces got the highest mean of 4.10, followed by creating a fillet or blend between two surfaces with a mean of 4.05 creating offset surfaces with a mean of 4.00, and editing primitives with a mean of 4.00. The rest of the skills got an interpretation of well delivered.

To top it all, the extent of teaching the advanced CAD skills in the architectural drafting technology class got a grand mean of 3.73 which means well delivered. This means that none among the identified competencies in advanced CAD skills were taken in the class. It was manifest that these topics were well taught in the major subject of drafting technology, and they have ample time to practice the activity using the computers. The drafting technology curriculum prepares students to meet the design and drafting needs of engineering, architectural, and manufacturing firms (College of Redwood, 2009)

Basic Architectural Drawings. All the identified skills under basic architectural drawing was perceived to be very well delivered except for the skills like preparing HVAC drawings with a mean of 4.10 and interpreting vendor's catalogs, technical tables and building codes with a mean of 3.95 with an interpretation of well delivered. Considering the overall responses, the extent of teaching the basic skills in basic architectural drafting class is perceived to be very well delivered with an overall mean of 4.46. The result of the study implies that these skills were necessary in architectural drawing, as required also by the construction industry (Francisco, 2000).

Basic Structural Drawings. Among the basic structural drawing skills, detailing concrete reinforcements got a highest mean of 4.45 with an interpretation of very well delivered. This was followed by drawing structural framing plans and elevations with a mean of 4.42, detailing beam connections with a mean of 4.40, using structural member and reinforcing concrete and manual technical tables with a mean of 4.35 and identifying welding symbols with a mean of 4.28. Two (2) of the skills were labeled as well delivered, and these are preparing materials take off lists 4.15 and other advanced CAD skills with a mean of 3.80.

However, the overall results displayed that the extent of teaching the basic structural drawings in architectural drafting technology class was very well delivered with a grand mean of 4.26. This means that the identified competencies were very much taught in the class.

Basic Civil Drawings. The result of the study revealed that the extent of teaching the basic civil drawings competencies were considered as well delivered in the classroom, as exhibit by the graduates in the industry. The skill with the highest weighted mean was preparing drainage drawing with a mean of 4.05.

This skill was necessary for creating drainage plans which was a very important factor in the construction (Francisco, 2000).

Basic Electrical Drawings. The extent of teaching basic electrical drawings in architectural drafting competencies were considered as well delivered in the institution as observed on the skills exhibited by the graduates. The respondents perceived that the identified competencies were very well delivered in class with a grand mean of 4.44. Two (2) among the competencies got the highest weight, and these are preparing electrical plan and preparing load computation with a mean of 4.50.

3.6. Perceived Level of Teacher's Competence In Autocad Technology

Basic CAD. The teachers were very much competent in five (5) areas namely; utilizing geometry editing commands with a mean of 5.00, creating new drawing, constructing geometric figures, creating texts using appropriate style and size, and other advanced CAD skills with a mean of 4.50. The teachers were perceived to be much competent in other twelve (12) areas namely; revolving a profile to create a 3-D object, controlling entity properties and other advanced skills got a mean of 4.00, creating wireframe or solid models, creating a 2-D geometrical from 3-models, creating a 3-D wireframe models from 2-D geometry, utilizing geometric editing commands, and controlling coordinates and display scale got a mean of 3.50.

On the other hand, the respondents perceived that their teachers were competent in some areas, and these include using and controlling accuracy enhancement tools, identifying, creating, storing, and using appropriate symbols or libraries, and other advanced CAD skills with a mean of 3.00.

Two (2) among the competencies the respondents perceived that the teachers were less competent. These are editing objects using primitives and other advanced CAD skills not listed with a mean of 2.50. Considering the overall skills under basic CAD, the teachers were labeled a much competent rating with a grand mean of 3.63.

Advanced CAD. The teachers were perceived to be much competent in two (2) skills namely; creating offset surfaces and creating wireframe or solid models with means of 4.00 and 3.50 respectively. The teachers were labeled as competent in nineteen (19) identified skills, all with a mean of 3.00. On the other hand, the teachers were considered as less competent in eight (8) competencies and these are; extracting wireframe from surface or solid geometry, extracting attribute data, obtaining mass properties data, creating analytic surfaces using appropriate modeling with planes and analytic curves, editing control points, modifying geometry with Boolean operations, performing axis view clipping, and manipulating associated non-graphical data. Exceptional proficiency and capability are needed to meet these skills. Teachers may consider improving their proficiency level through attendance in training and seminars on this field.

In totality, the teachers were perceived to be competent in advanced CAD skills with a mean of 2.83. The grand mean is not high; this further implies that there are specific skills that the teachers have to acquire to be able to deliver the expected goods to the students.

Basic Architectural Drawings. The result of the study revealed that teachers were considered as very much competent in their skills such as in preparing floor plans with dimensions, preparing foundation plans and detail drawings with dimensions, and preparing elevation drawings with dimensions. The teachers were identified to be much competent in nine (9) skills and competent in three (3) skills.

As a whole, the teachers were perceived to be competent in basic architectural drawings with a grand mean of 3.80. This means that the teachers know the field they teach and be able to demonstrate strong pedagogical knowledge and skills.

Basic Civil Drawings. The teachers were competent in only one skill. This skill include; preparing plan and profile drawings with a mean of 3.00. However, the rest of the skills were considered as less competent.

For the overall result, the teachers were perceived as less competent in basic civil drawings with a mean of 2.25. Teachers have to double their efforts in upgrading their skills on these skills because these are necessary for students to acquire for them to be able to be competent in their work in the future.

3.7. Level of Teacher's Competence, Extent of Teaching and Level of Importance of AutoCAD Competencies

Table 1 presents the summary of the perceived level of teacher's competence in AutoCAD technology, extent of teaching AutoCAD competencies in the class, and the perceived level of importance of AutoCAD competencies in the construction industries of Cebu.

In the area of teacher's competence, teachers were considered as much competent with a mean of 3.44. Teachers have the necessary knowledge and skills in delivering the lessons to the students. Teachers play a vital role in molding their students because the quality of students they were producing often reflects the kind of teachers who shaped them.

In terms of the extent of teaching the AutoCAD competencies in the AutoCAD technology class, it was perceived to be well delivered with a mean of 4.17. This implies that the identified skills were taken up in class. In the area of the level of importance of AutoCAD competencies in construction industries, it was perceived to be much important with a mean of 3.90. These skills are much important for students to acquire because these are necessary in their field of work in the future.

The success in construction industries starts with good training in technology education with competent teachers and be able to produce good graduates who will be able to land a good job, and expected to deliver excellent work, and be able to contribute to the success of the company and the economy as well. In the CHED Handbook on Typology (2014), program outcomes are the sets of competencies (related knowledge, skills, and attitudes) that all learners are expected to demonstrate.

Table 1: Summary Table on the Level of Teacher's Competence, Extent of Teaching and Level of Importance of AutoCAD Competencies

AutoCAD Competencies	Teachers (Competence)		Student (Delivered)		Company (Importance)	
	mean	VD	mean	VD	mean	VD
Basic CAD	3.63	MC	4.17	MT	4.21	VMI
Advanced CAD	2.83	C	3.73	MT	3.24	I
Architectural	3.80	MC	4.46	VMT	4.50	VMI
Structural	3.67	MC	4.26	VMT	3.74	MI
Civil	2.25	LC	3.97	MT	3.84	MI
Electrical	4.50	VMC	4.44	VMT	3.91	MI
TOTALITY	**3.44**	**MC**	**4.17**	**MT**	**3.90**	**MI**

3.8. Relationship Level of Competence of Students and Teachers in Autocad Technology

Based on the results of the correlation analysis, it was revealed that the three (3) variables: Teacher's competence of AutoCAD, student's perception on the extent of teachers teaching AutoCAD and the importance of AutoCAD by industries were significantly related (Table 2). This finding signifies how academe and industry importance of AutoCAD matched each other. Manalang (1997) stressed that vocation/technical education is a shared responsibility of educational institutions and the industry. Robles (1998) also espoused that desirable work habits and attitudes should be developed in order to fare well in the industry.

There was a clear and undeniable link between the three (3) variables. The result implies that Teacher's competence in AutoCAD preparation greatly affects the quality of architectural drafting graduates. However, Teachers should not be left alone in the education process and should be retrained to meet up with the evolving trends in education.

Competencies that are most favored by construction industries must be taught well in the technology class so that students will be harnessed, trained and prepared for fieldwork. The result of the study was supported by Diergos' (2005) in which knowledge in the operation of AutoCAD (greater extent of utilization of basic and advanced CADD commands and options, organizing information with layers, and developing plans, elevations, and details are done) give the students greater avenues of opportunities to engage in more complex activities on building construction industries.

Table 2: Relationship Between Level of Competence of Students and Teachers in AutoCAD Technology

Perceptions	Teachers Competence on AutoCAD Skills		Students	
	r	p-value	r	p-value
Students perceptions of extent in teaching AutoCAD	0.624	<.001		
Company level of importance on AutoCAD	0.591	<.001	0.700	<.001

3.9. Problems in Teaching Autocad and Student Use of Autocad in the Industries

The most pressing problem met by the respondents in AutoCAD was the lack of facilities which ranked number one (1). Next in rank was lack of time in using computers, followed by unupdated software, lack space in the classroom, and lack time for AutoCAD instruction. Considering that CAD instruction is one of the major subjects in architectural drafting, sufficient facilities should be made available for students' use. As required by AACCUP, at least 15 computer units should be available in each laboratory, however, only five (5) computers were available with AutoCAD software and only three (3) were functional. With this scenario, most of the students extend their time in some of the internet café outside the

campus to finish their project.

Unupgraded software is also another constraint. It is hard to acquire licensed software in AutoCAD because it is expensive and was not considered as a top priority of the school.

On the other hand, the class laboratory size is not enough to accommodate students and facilities. It does not allow free-flow of movement so that students and teachers can focus or concentrate on their work. Drafting room has an area of 60 sq. meters which is not ideal for a drafting technology shop.

And the last concern is the time spent for AutoCAD instruction. Instructors focus on manual drafting which is the foundation of drafting and designing. AutoCAD is only a tool used to facilitate and store drawings. In order to improve AutoCAD instruction and to be able to produce quality architectural drafting graduates, these concerns have to be addressed.

The result of the study serve as a validation in the further improvement of the programs of Industrial Technology for global competitiveness, CIT adopted the rules for implementation of Republic Act (RA) No. 8272, otherwise known as the "Higher Education Modernization Act of 1997."

4. CONCLUSIONS

Based on the result of the study, there was a strong significant relationship between the company's Auto Computer-Aided Design skill requirements and the extent to which these requirements were taught.

The most pressing problem met by the respondents in Auto Computer-Aided Design was the lack of facilities, lack of time, updated software, lack of space in the classroom, and lack of time for Auto Computer-Aided Design instruction.

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